Texture-modified 3D printed dark chocolate: Sensory evaluation and consumer perception study

ABSTRACT

This study aimed to assess the preferences and perceptions of texture-modified three-dimensional (3D) printed chocolate through three measures: two tasting tests and one survey. In the first test, 30 semi trained panelists ranked their overall preference from among the three samples of chocolate printed in a honeycomb pattern with infill percentages (IPs) of 25, 50, and 100%. The panelists ranked the samples based on appearance and hardness. In the second test, the same panelists nominated one preference between a 3D printed sample (100% IP) and a cast commercial chocolate sample. Friedman test indicated that there was no significant difference in overall preferences for hardness although the panelists significantly preferred the appearance of samples with 25 and 50% over the 100% infill. Furthermore, there was no significant difference in preference between the cast and 100% infill samples. The texture data of the chocolate samples showed that a higher force was required to break the chocolate samples as the IP increased from 25% ($20.4 \pm 1.1\,\mathrm{N}$) to 100% ($54.4 \pm 1.5\,\mathrm{N}$). Also, the 3D printed chocolate (printed in 100% IP) was found to be less hard than that of casted chocolate. In the survey of consumer perceptions, a total of 244 participated and assessed the samples for their intricate design and novel technology concept through a questionnaire. While there was a general awareness of 3D printing technology among these participants, many were impressed with the application of 3D printing to chocolate, as this was the first time they had seen this. The results obtained from the sensory tests and consumer survey provided a useful insight into consumers' perception of 3D food printing and the 3D products design. This awareness will be beneficial to promote this technology in the food industry.